

What is claimed is:

1. Glass for a light filter having a coefficient of thermal expansion within a range from  $90 \times 10^{-7}/^{\circ}\text{C}$  to  $120 \times 10^{-7}/^{\circ}\text{C}$  within a temperature range from  $-20^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$  and having a composition which comprises, in weight percent:

one or more ingredients selected from the group consisting of  $\text{SiO}_2$ ,  $\text{B}_2\text{O}_3$  and  $\text{P}_2\text{O}_5$  in the total amount of 35 - 55%, wherein the upper limit of  $\text{SiO}_2$  is 41.5%;

one or more ingredients selected from the group consisting of  $\text{TiO}_2$ ,  $\text{La}_2\text{O}_3$ ,  $\text{ZrO}_2$ ,  $\text{Nb}_2\text{O}_5$ ,  $\text{Ta}_2\text{O}_5$ ,  $\text{WO}_3$  and  $\text{Y}_2\text{O}_3$  in the total amount of 20 - 45%, wherein  $\text{TiO}_2$  up to 30% is included and  $\text{ZrO}_2$  is included within a range from 0 to 5%;

one or more ingredients selected from the group consisting of  $\text{MgO}$ ,  $\text{CaO}$ ,  $\text{SrO}$ ,  $\text{BaO}$  and  $\text{ZnO}$  in the total amount of 3 - 20%;

$\text{Na}_2\text{O}$  within a range from 0 to 14.5%; and

one or both of  $\text{Sb}_2\text{O}_3$  and  $\text{As}_2\text{O}_3$  in the total amount of 0 - 1%,

said glass being substantially free of  $\text{Al}_2\text{O}_3$ ,  $\text{CdO}$  and  $\text{PbO}$ .

2. Glass as defined in claim 1 which has Young's modulus of 75GPa or over.

3. Glass as defined in claim 1 which has Vickers hardness of 550 or over.

4. Glass as defined in claim 1 wherein light transmittance for plate thickness of 10mm is 90% or over within a wavelength range from 950nm to 1600nm.

5. A light filter which is made by forming a dielectric film on glass as defined in claim 1.

6. A light filter which is made by forming a dielectric film on glass having a larger coefficient of thermal expansion than dielectric which constitutes the dielectric film.

7. Glass for a light filter having a coefficient of thermal expansion within a range from  $90 \times 10^{-7}/^{\circ}\text{C}$  to  $120 \times 10^{-7}/^{\circ}\text{C}$  within a temperature range from  $-20^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$  and having a composition which comprises, in weight percent:

one or more ingredients selected from the group consisting of  $\text{SiO}_2$ ,  $\text{B}_2\text{O}_3$  and  $\text{P}_2\text{O}_5$  in the total amount of 35 - 55%, wherein the upper limit of  $\text{SiO}_2$  is 41.5%;

$\text{TiO}_2$  up to 30%;

$\text{ZrO}_2$  within a range from 0 to 5%;

one or more ingredients selected from the group consisting of  $\text{MgO}$ ,  $\text{CaO}$ ,  $\text{SrO}$ ,  $\text{BaO}$  and  $\text{ZnO}$  in the total amount of 3 - 20%;

one or more ingredients selected from the group consisting of  $\text{Li}_2\text{O}$ ,  $\text{Na}_2\text{O}$  and  $\text{K}_2\text{O}$  in the total amount of 5 - 30%, wherein  $\text{Na}_2\text{O}$  is included within a range from 0 to 14.5%; and

one or both of  $\text{Sb}_2\text{O}_3$  and  $\text{As}_2\text{O}_3$  in the total amount of 0 - 1%,  
said glass being substantially free of  $\text{Al}_2\text{O}_3$ ,  $\text{CdO}$  and  $\text{PbO}$ .

8. Glass as defined in claim 7 which has Young's modulus of 75GPa or over.

9. Glass as defined in claim 7 which has Vickers hardness of 550 or over.

10. Glass as defined in claim 7 wherein light transmittance for plate thickness of 10mm is 90% or over within a wavelength range from 950nm to 1600nm.

11. A light filter which is made by forming a dielectric film on glass as defined

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in claim 7..

12. Glass for a light filter having a coefficient of thermal expansion within a range from  $90 \times 10^{-7}/^{\circ}\text{C}$  to  $120 \times 10^{-7}/^{\circ}\text{C}$  within a temperature range from  $-20^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$  and having a composition which comprises, in weight percent:

one or more ingredients selected from the group consisting of  $\text{SiO}_2$ ,  $\text{B}_2\text{O}_3$  and  $\text{P}_2\text{O}_5$  in the total amount of 35 - 55%, wherein the upper limit of  $\text{SiO}_2$  is 41.5%;

one or more ingredients selected from the group consisting of  $\text{TiO}_2$ ,  $\text{La}_2\text{O}_3$ ,  $\text{ZrO}_2$ ,  $\text{Nb}_2\text{O}_5$ ,  $\text{Ta}_2\text{O}_5$ ,  $\text{WO}_3$  and  $\text{Y}_2\text{O}_3$  in the total amount of 20 - 45%, wherein  $\text{TiO}_2$  up to 30% is included and  $\text{ZrO}_2$  is included within a range from 0 to 5%;

one or more ingredients selected from the group consisting of  $\text{MgO}$ ,  $\text{CaO}$ ,  $\text{SrO}$ ,  $\text{BaO}$  and  $\text{ZnO}$  in the total amount of 3 - 20%;

$\text{Na}_2\text{O}$  within a range from 0 to 14.5%; and

one or both of  $\text{Sb}_2\text{O}_3$  and  $\text{As}_2\text{O}_3$  in the total amount of 0 - 1%,

said glass being substantially free of  $\text{Al}_2\text{O}_3$ ,  $\text{CdO}$  and  $\text{PbO}$ .

13. Glass as defined in claim 12 which has Young's modulus of 75GPa or over.

14. Glass as defined in claim 12 which has Vickers hardness of 550 or over.

15. Glass as defined in claim 12 wherein light transmittance for plate thickness of 10mm is 90% or over within a wavelength range from 950nm to 1600nm.

16. A light filter which is made by forming a dielectric film on glass as defined in claim 12.

17. Glass for a light filter having a coefficient of thermal expansion within a range from  $90 \times 10^{-7}/^{\circ}\text{C}$  to  $120 \times 10^{-7}/^{\circ}\text{C}$  within a temperature range from  $-20^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$  and having a composition which comprises, in weight percent:

one or more ingredients selected from the group consisting of  $\text{SiO}_2$ ,  $\text{B}_2\text{O}_3$  and  $\text{P}_2\text{O}_5$  in the total amount of 35 - 55%, wherein the upper limit of  $\text{SiO}_2$  is 41.5%;

one or more ingredients selected from the group consisting of  $\text{TiO}_2$ ,  $\text{La}_2\text{O}_3$ ,  $\text{ZrO}_2$ ,  $\text{Nb}_2\text{O}_5$ ,  $\text{Ta}_2\text{O}_5$ ,  $\text{WO}_3$  and  $\text{Y}_2\text{O}_3$  in the total amount of 20 - 45%, wherein  $\text{TiO}_2$  up to 30% is included;

one or more ingredients selected from the group consisting of  $\text{MgO}$ ,  $\text{CaO}$ ,  $\text{SrO}$ ,  $\text{BaO}$  and  $\text{ZnO}$  in the total amount of 3 - 20%;

one or more ingredients selected from the group consisting of  $\text{Li}_2\text{O}$ ,  $\text{Na}_2\text{O}$  and  $\text{K}_2\text{O}$  in the total amount of 5 - 30% (circled B) wherein  $\text{Na}_2\text{O}$  is included within a range from 0 to 14.5%; and

one or both of  $\text{Sb}_2\text{O}_3$  and  $\text{As}_2\text{O}_3$  in the total amount of 0 - 1%,

said glass being substantially free of  $\text{CaO}$  and  $\text{CdO}$ .

18. Glass as defined in claim 17 which has Young's modulus of 75GPa or over.

19. Glass as defined in claim 17 which has Vickers hardness of 550 or over.

20. Glass as defined in claim 17 wherein light transmittance for plate thickness of 10mm is 90% or over within a wavelength range from 950nm to 1600nm.

21. Glass as defined in claim 17 which is substantially free of  $\text{PbO}$ .

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22 A light filter which is made by forming a dielectric film on glass as defined in claim 17..

23. Glass for a light filter having a coefficient of thermal expansion within a range from  $90 \times 10^{-7}/^{\circ}\text{C}$  to  $120 \times 10^{-7}/^{\circ}\text{C}$  within a temperature range from  $-20^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$  and having a composition which comprises, in weight percent:

one or more ingredients selected from the group consisting of  $\text{SiO}_2$ ,  $\text{B}_2\text{O}_3$  and  $\text{P}_2\text{O}_5$  in the total amount of 35 - 55%, wherein the upper limit of  $\text{SiO}_2$  is 41.5%;

one or more ingredients selected from the group consisting of  $\text{TiO}_2$ ,  $\text{La}_2\text{O}_3$ ,  $\text{ZrO}_2$ ,  $\text{Nb}_2\text{O}_5$ ,  $\text{Ta}_2\text{O}_5$ ,  $\text{WO}_3$  and  $\text{Y}_2\text{O}_3$  in the total amount of 20 - 45%, wherein  $\text{TiO}_2$  up to 30% is included;

one or more ingredients selected from the group consisting of  $\text{MgO}$ ,  $\text{CaO}$ ,  $\text{SrO}$ ,  $\text{BaO}$  and  $\text{ZnO}$  in the total amount of 3 - 20%;

one or more ingredients selected from the group consisting of  $\text{Li}_2\text{O}$ ,  $\text{Na}_2\text{O}$  and  $\text{K}_2\text{O}$  in the total amount of 5 - 30%, wherein  $\text{Na}_2\text{O}$  is included within a range from 0 to 14.5%; and

one or both of  $\text{Sb}_2\text{O}_3$  and  $\text{As}_2\text{O}_3$  in the total amount of 0 - 1%,  
said glass being substantially free of  $\text{CaO}$  and  $\text{CdO}$ .

TOP SECRET EYES ONLY

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